

APPENDIX II

MISCELLANEOUS INFORMATION



Maritime and Coastguard Agency

MARINE GUIDANCE NOTE

MGN 349 (M+F)

Carriage and Use of Radar Reflectors on Small Vessels

Notice to all Owners, Operators, Masters and Skippers of small vessels under 150 tons including Pleasure craft

PLEASE NOTE:-

Where this document provides guidance on the law it should not be regarded as definitive. The way the law applies to any particular case can vary according to circumstances - for example, from vessel to vessel and you should consider seeking independent legal advice if you are unsure of your own legal position.

Summary

- The recent loss of the yacht 'Ouzo' and her crew highlighted the potentially fatal consequences of poor radar visibility of small vessels.
- SOLAS Chapter V Regulation 19.2.1.7 states that a ship shall have:
'if less than 150 gross tonnage and if practicable, a radar reflector, or other means, to enable detection by ships navigating by radar at both 9 and 3 GHz'.
- All small craft should correctly and permanently install a radar reflector, either passive or active (powered), that meets the standards laid down in British Standard BS EN ISO 8729:1998 (ISO standard 8729: 1997).
- Vessels under 15m overall length should be fitted with the most efficient reflector that the vessel can accommodate.

1. Introduction/ Background

1.1 The loss of the yacht 'Ouzo' in August 2006 was investigated by the Marine Accident Investigation Branch (MAIB). Their report, published in April 2007 (report 7/2007), raised several issues including the characteristics of the vessel as a good radar target. The MAIB commissioned a study by QinetiQ designed to inform yachtsmen of the most appropriate choice of radar reflector for their craft. They further tasked the Maritime and Coastguard Agency (MCA) together with the Royal Yachting Association (RYA) to promulgate guidance on the carriage of radar reflectors to all seafarers but specifically owners and skippers of small recreational craft.

- 1.2 The physics of radar detection is a complex subject which depends primarily on the quality and height of the interrogating radar, and the range, size, shape and aspect of the vessel involved (target). Target detection is also affected by other external factors including sea state, wave shape and direction, multipath cancellations and rain. Commercial shipping uses radar equipment that operates in the 'X' band (9GHz) and the 'S' band (3GHz), which each present their own problems and advantages. The probability of detecting small craft, particularly those not fitted with a radar reflector, may be degraded by any or all of the environmental factors and this has always presented a challenge to mariners and equipment manufacturers.
- 1.3 Although it cannot be overemphasised that there is no guarantee that a small vessel will consistently show on radar screens, a correctly fitted reflector with a consistent echoing area or Radar Cross Section (RCS) is a crucial factor in increasing the overall probability of detection. Owners and skippers of small craft are strongly urged to fit the most effective and appropriate radar reflector for their circumstances.

2. Requirements for carriage

- 2.1 SOLAS Chapter V Regulation 19 2.1.7 states that a ship shall have:

'if less than 150 gross tonnage and if practicable, a radar reflector, or other means, to enable detection by ships navigating by radar at both 9 and 3 GHz'

- 2.2 MCA guidance to SOLAS Chapter V Regulation 19 2.1.7 is published in *'Implementing SOLAS Chapter V Annex 15.'*

3. Notes on selection and installation

The following notes give further guidance on the choice of a radar reflector for small vessels.

- 3.1 Reflectors meeting the technical standards laid down in British Standards BS EN ISO 8729:1998 (ISO standard 8729:1997) may carry an EU 'Wheelmark' to Annex A.1 Item 4.39 signifying that they have been type-approved to this standard for general use as a radar reflector. In 2005, the IMO performance standard was revised (IMO Resolution MSC.164(78)). This will lead to a revised ISO technical standard based on the 2005 IMO revision and is likely to be published in 2008. Until the revised technical standard is published, ISO 8729:1997 will remain in force.
- 3.2 An important parameter of a radar reflector is the 'echoing area', or equivalent radar cross-section (RCS), as this determines the amount of radar energy that is reflected back. Reflectors that meet the above standards and have been type-approved will have the 'Wheelmark' applied. The following are the basic requirements of the ISO 8729:1997 test standard (currently under review to include the improved requirements of IMO Resolution MSC.164(78)).
 - A peak RCS of at least 10 m²;
 - An RCS of at least 2.5 m² over an azimuth angle of at least 240° when the reflector is vertical (i.e. not heeled over);
 - An RCS of at least 0.625 m² over an azimuth angle of at least 240° for angles of heel up to +/- 15°.
- 3.3 The correct installation and orientation of the reflector must follow manufacturers' recommendations if it is to be effective.

3.4 SOLAS Chapter V Regulation 19 recognises that reflectors built to the above standards are relatively large and may not be practical for fitting to smaller vessels. The MCA considers that fitting reflectors meeting ISO standards to vessels of 15m or more in length should be practicable and in many cases vessels below 10m are able to mount a reflector meeting the current ISO standard safely.

3.5 Many operators of radar systems use automatic guard zones set at 3nm to 5nm, to warn of approaching vessels and a consistent radar target response is important to trigger this function. It is emphasised that the reflector must be mounted at a minimum height of 3m (preferably 4m) above sea level to take it out of any wave obscuration effects and give a potential detection range of 5nm, which was used in setting the ISO 8729 criteria.

3.6 A Radar Target Enhancer (RTE) is an active form of reflector requiring a power supply. It receives a radar pulse, amplifies and re-transmits the signal. An RTE has a larger equivalent RCS for a physically small size than passive radar reflectors and produces a response on an 'X' band radar display, which is stronger and more consistent. Mariners should note that radar enhancers currently available (2007) do not operate in the radar 'S' band.

4. Recommendations

It is strongly recommended that:

4.1 The requirements of SOLAS Chapter V Regulation 19 are complied with;

4.2 Yachtsmen **permanently install**, not just carry on-board, a radar reflector or RTE that offers the largest Radar Cross Section (RCS) practicable for their vessel;

4.3 Small craft owners and operators are strongly recommended to fit the best performing radar reflector possible. It is also essential for skippers to be aware that, notwithstanding the type of radar reflector fitted, in certain circumstances their craft may still not be readily visible on ships' radars. They should navigate with caution.

4.4 The following reports published by the Marine Accident Investigation Branch are considered during the process of selecting a radar reflector.

http://www.maib.gov.uk/cms_resources/Radar_reflectors_report.pdf

http://www.maib.gov.uk/cms_resources/Ouzo_Flyer_to_Leisure_industry.pdf

More Information

Navigation Safety Branch
Maritime and Coastguard Agency
Bay 2/29
Spring Place
105 Commercial Road
Southampton
SO15 1EG

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Fax . +44 (0) 23 8032 9137
e-mail: lnavigation.safety@mcga.gov.uk

General Inquiries: 24 Hour Infoline
info@mcga.gov.uk
0870 600 6505

MCA Website Address: www.mcga.gov.uk

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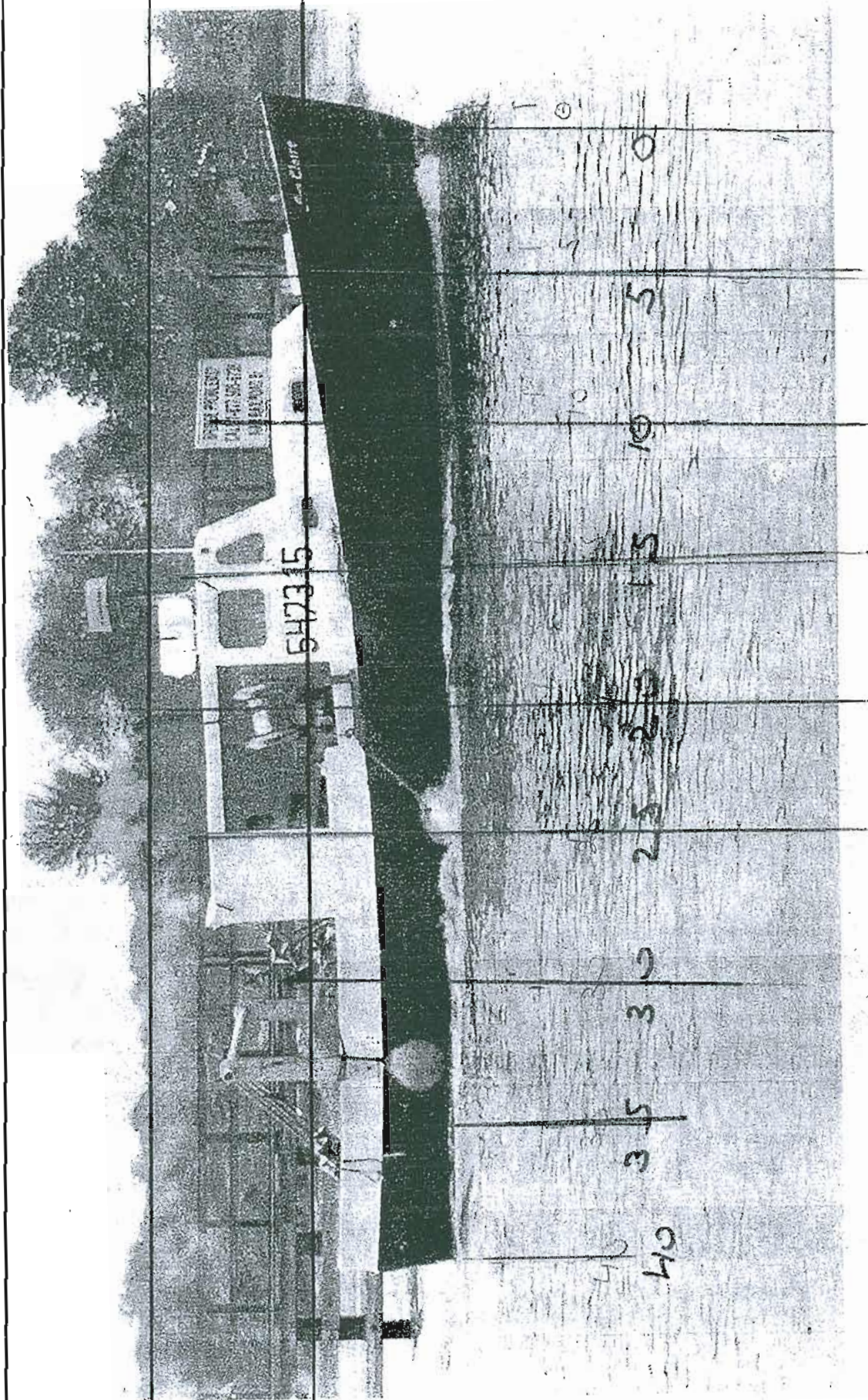
An executive agency of the
Department for
Transport

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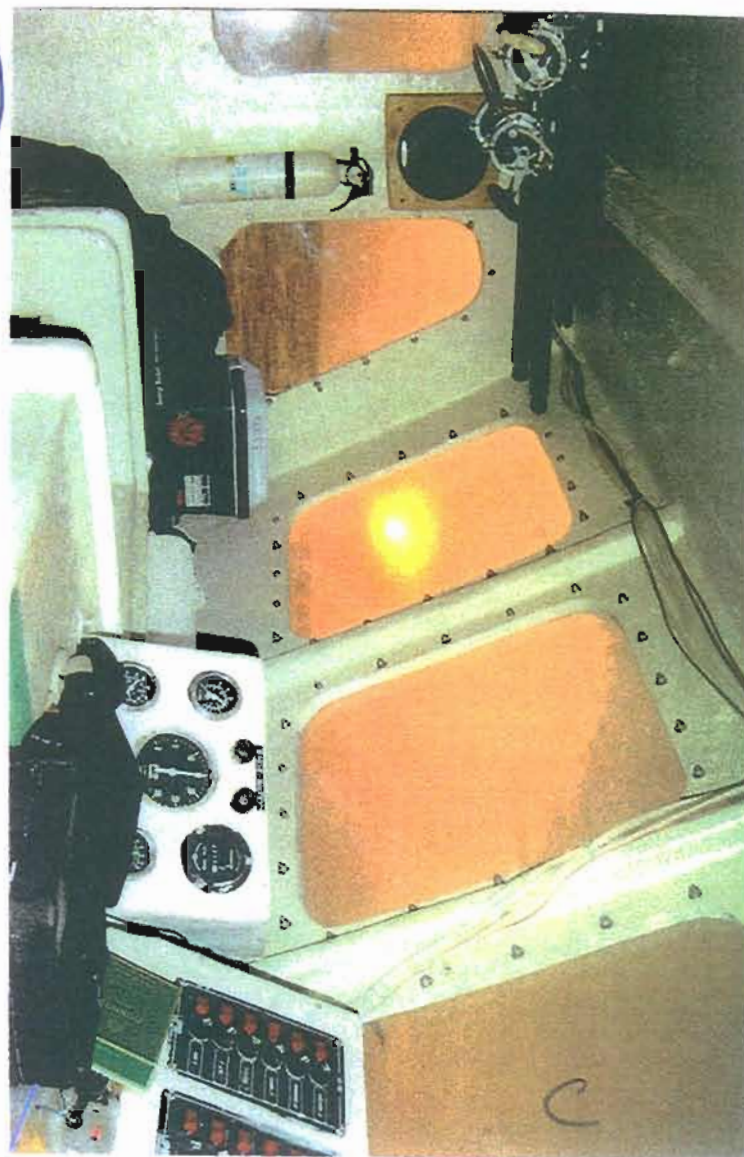
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Satellite₂ 406™

Product No. 2775.5 Cat II (Manually Deployed)
406 MHz EPIRB
Model No.: RLB-32 Cat II

- World's smallest 406 MHz EPIRB that meets all regulations and is fully approved worldwide
- Patented proprietary electronics package provides greater frequency stability for most accurate position through the LEOSAR satellites
- Full functional self test of internal circuitry, and battery voltage test
- High-impact polycarbonate case with non-tangling lanyard
- Universal Low Pro™2 Category II EPIRB Bracket (P/N 9430) included: bulkhead and rail mounting options

- Class 1 battery for colder temperature operation; minimum 48 hrs @ -40°C (-40°F), 5 year replacement
- Automatically activated when out of bracket and in the water or manually activated
- Transmits on 406 MHz (COSPAS-SARSAT) with your registered, digitally-coded distress signal, and 121.5 MHz (SAR homing frequency)
- Audio/visual indicators of active transmission
- Floats upright with high visibility built-in strobe

Size: 14.5 x 4.25 x 3.62 in (36.8 x 10.8 x 9.2 cm)

Weight: 1.9 lbs (.861 kg)

Material: High impact polycarbonate blend case/polyethylene bracket

Color: Hi-Viz Yellow/White bracket

Deployment: Manual

Operation: Lift switch up, slide left, push down fully breaking tab; water activated when out of bracket

Waterproof: 33 ft (10 m)

Accessories: 1096 Battery Replacement Kit

Certification: Approved by COSPAS-SARSAT, FCC, USCG; complies with GMDSS, European MED

Radiated Power: 5 watts ± 2dB (406 MHz) 50 mW ± 3 dB (121.5 MHz)

Battery Type: Lithium 5-year replacement life (11-year storage life)

Frequency: 406.028 MHz, 121.5 MHz

Carton Weight: 3.0 lbs (1.36 kg)

Carton Dimensions: 18.0 x 7.0 x 6.0 in (45.7 x 17.8 x 15.0 cm)

Units Per Carton: 1

Modulation: AM

Limited Warranty: 5 years

U.S. Patent No. 6,501,340



ACR Electronics, Inc.
 5757 Ravenswood Road
 Fort Lauderdale, FL 33312, U.S.A.
 Tel Worldwide: +1(954) 981-3333
 Fax: +1(954) 983-5057
 www.acrelectronics.com

A Chelton Group Company



HIGH DENSITY POLYETHYLENE

NYLON STRAP & BUCKLE

Regulatory 406 (P/N 2771)
SATELLITE 406 (P/N 2775)
SATELLITE 406 (P/N 2780)
Regulatory 8 (P/N 2768)

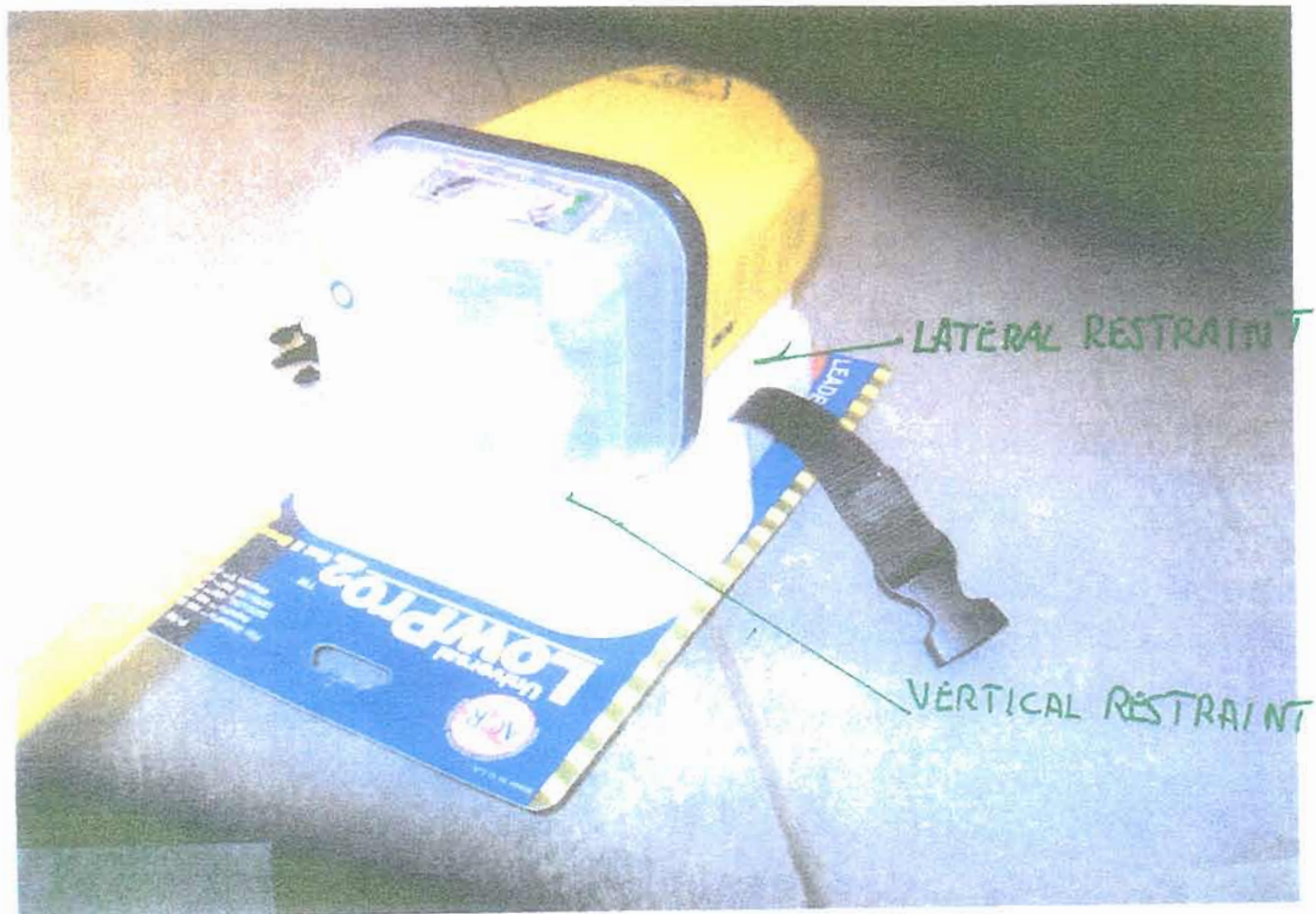
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APPENDIX III

REVIEWED DOCUMENTS AND INFORMATION

APPENDIX III

Reviewed Information

Materials Received from Blank Rome LLP

- US Coast Guard Report of Investigation
- Michael Stepski deposition transcripts (2) and exhibits including chart
- Benjamin Schrober deposition transcript and exhibits
- Geal Roderick deposition transcript and exhibits
- Deposition exhibits 1,2,4,8-11,13-16,30,31
- Capt. Maeiej Kowalewski deposition transcript and exhibits including chart
- Deposition Exhibits 1-7,9,10, 12-14, 16-21
- Third Officer Adrian Calimanescu deposition transcript and exhibits
- Capt Ahlstrom report
- Capt. Ahlstrom deposition & exhibits including chart
- USCG/NOAA SARSAT Conference "EPIRB's How They Work January 2008
- United States Mission Control Center (USMCC) National Rescue Coordination Center (RCC) and Search And Rescue Point of Contact (SPOC) Alert and Support Messages 28 January 2008 Version 1.81
- NOS Chart 12,300 Approaches to New York
- Ava Claire wreckage photographs – (34)
- USCG CD ROM of photographs from attempted debris recovery
- Excerpt of Admiralty Sailing Directions provided by Captain Ahlstrom

Publications

- U.S. Coast Pilot 2 2008 37th Edition
- SOLAS Consolidated Edition 2004 IMO ID110E
- The Mariners Handbook NP 100 8th Edition 2004 - Admiralty
- Annual Summary of Admiralty Notices to Mariners NP 247 2007 Edition
- Ships' Routing Eighth Edition, 2003 IMO
- Maritime and Coastguard Agency MGN 349 (M+F) Carriage and use of Radar Reflectors on Small Vessels
- Maritime & Coastguard Agency Communication and Innovation SOLAS V for pleasure craft (MCA/098)
- Maritime and Coastguard Agency MGN 324 (M+F) Radio: Operational Guidance on the Use of VHF Radio and Automatic Identification Systems (AIS) at Sea
- Farwell's Rules of the Nautical Road 8th Edition Craig Allen Naval Institute Press 2005
- Collisions and Their Causes Captain R.A. Cahill 3rd edition The Nautical Institute
- Collision Cases Judgments and Diagrams F.J. Buzek and H.M.C. Holdert 2nd edition Lloyds of London Press

- 33 CFR Parts 125-199 July 2005 Part 164 Navigation Safety Regulations Part 166 Shipping Safety Fairways
- 46 CFR Parts 1 to 40 Part 28 Requirements for Commercial Fishing Industry Vessels October 2006
- Canada Shipping Act VHF requirements <http://www.tc.gc.ca/acts-regulations/GENERAL/C/CSA/regulations/090/csa096/csa96.html>
- **Maritime Education and training information**
- Northeast Maritime Institute www.northeastmaritime.com/
- Sea School www.seaschool.com
- Massachusetts Maritime Academy Graduate and Continuing Education www.maritime.edu/cmt Course descriptions: Understanding Radar, Rules of the Road for small boat operators, USCG license programs: OUPV, 100 ton Master License Radar Observer Endorsement
- Alaska Marine Safety Education Association www.amsea.org

Miscellaneous

- COSPAS-SARSAT www.cospas-sarsat.org
- Furuno Product brochure - AIS receiver FA-30, FA-150
- Furuno Product brochure 2008
- Raymarine Product brochure - Multifunction navigation displays C70, C80, C120
- Telcon interview with ACR Electronics' Service Manager, Mr. Nico Buckle tel: 954 862 2155 on 21 April 2008, reference EPIRB bracket and CAT II units.
- ACR Electronics Universal Low Pro 2 cat II EPIRB bracket P/N 9430
- Interview with Custom Navigation systems, Senior Technician Westbrook Ct reference: Furuno radars and active and passive radar reflector systems, 24 April 2008.
- IMO MSC.87(70) Adoption of New and Amended Performance Standards for Navigational Equipment. Annex 17/ Annex I Recommendation on Performance Standards for Sound Reception Systems.
- Zenitel Group Sound System Reception system www.zenitel.biz/index.php?option=com_content&task=view&id=41&Itemid=223

APPENDIX IV

PUBLICATIONS, TESTIMONY EXPERIENCE, FEES AND CURRICULUM VITAE

Appendix IV

1. Publications authored within the past ten years: None
2. Compensation rate for study and testimony \$175.00/ per hour, plus expenses
3. Depositions, arbitrations, mediations or trials within the last 4 years:

2007

Holland & Knight LLP - Sinking of the *M.T. Prestige* - Kingdom of Spain v. The American Bureau of Shipping, et al (Deposition)

Hill Rivkins & Hayden LLP - Grounding of *Benedetta D'Amato* - Cementos Andinos Dominicanos SA v. Eitzen Sealift A/S (Arbitration)

Maloof Browne & Egan -- Heavy weather damage *M.V. Maritime Antalya* - Kyoei Fire & Marine Insurance Co. Ltd and National Federation of Agricultural Co-operative associations v. *M.V. Maritime Antalya*, SK Shipping Co., Ltd, Sun Glory Maritime Corp, Temm Maritime Co, Ltd and Sojitze Marine & Engineering Corporation. (Deposition)

2006

Halloran & Sage LLP- Bridge allision - MTA Metro-North Railroad and State of Connecticut v. Buchanan Marine, LP (Deposition)

2005

Skoufalos Llorca & Ziecardi LLP - Grounding -- *MV Atlantic Bulker* - Orinoco River Bulker Shipping Corp..... Owner of The *M/V Atlantic Bulker* v. Babun Bulk Shipping Corp., Charterer (Arbitration)

Hill Rivkins & Hayden LLP -- Collision - *M.V. Tricolor/Kariba/Clary* - Otal Investments Limited, Et. Al. Against Capital Bank Publie Limited company, Actinor Car Carrier I As, Wilh. Wilhelmsen Asa, Wallenius Wilhelmsen Lines As, Clary Shipping Pte Ltd., Mst Mineralien Schiffahrt Spedition Und Transport Gmbh, Mineral Shipping Co. Private Ltd., In Personam, And *M.V. Clary*, In Rem (Deposition)

Holland & Knight LLP - Near collision *M.T. New World*, Expedo Ship Management V Bouehard Transportation (Deposition & Mediation)

2004

Hill Rivkins & Hayden LLP - Collision in the Orinoco River: *M.V. Global Mariner V. M.V. Atlantic Crusader* -- (Deposition)

Holland & Knight LLP - Grounding of *M.T. Olympic Sponsor* in Venezuela (Arbitration)

Captain Bolton's CV and qualifications

U.S. Master Mariner & Master of Sail 500 gt. with thirty-nine years of international seafaring and maritime industry working experience, including eleven years of command.

1967 State University of New York, Maritime College Bachelor of Science Marine Transportation

Service as licensed deck officer aboard tankers, freighters, and container ships, engaged in both coastwise and worldwide service.

1973 – 1977 Chief Mate aboard USNS chartered break-bulk ships and tankers engaged in the multi-grade clean products trade. (1974 U.S. Masters license – any gross tons, any oceans)

1977 Appointed Master of a 90,000 DWT tanker, engaged in the Alaska North Slope crude oil trade - a position held for ten years. Throughout this period, obtained extensive experience with respect to: lightering, SPM, Panama Canal transit, TSS and safety fairway navigation.

1991 Assistant Mooring Master at the Louisiana Offshore Oil Platform

1991-1992 Master of a 265,000 deadweight ton, U.S. flag VLCC, engaged in Arabian Gulf/Korea trade. TSS navigation experience

1993- 1997 Consultant to ship-handling simulator manufacturing company

Extensive pilotage of ships from 300 gt to 265,000 dwt- more than twenty different ports.

Conducts tanker vetting inspections, and pre-charter and bunker surveys; provides port captain services; serves as owner's representative during oil companies' vetting inspections; and conducts ISPS ship security assessments and audits.

Has testified in marine arbitrations and court trials, and participated in deposition and mediation proceedings, generally regarding: collisions, navigation procedures, groundings, and tanker operations.

Approved by U.S. Coast Guard as instructor for the Bridge Resource Management and the Tankerman, "Person in Charge" DL

Former Connecticut State Pilot Commissioner.

Former master of tall ships: Elissa, Gazela of Philadelphia, and HMS Bounty.